

## The importance of active surveillance in the detection of tuberculosis patients

Active surveillance of tuberculosis

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### Abstract

**Aim:** Tuberculosis (TB) is one of the earliest and most contagious diseases of history with high morbidity and mortality. Effective surveillance is crucial for disease control. One component of active surveillance is screening of all biopsy reports regarding TB, and reporting them once identified. In this study, pathology reports were evaluated for TB, cases were traced for diagnosis of TB, and contribution of active surveillance on diagnosis was assessed. **Material and Method:** The surveillance unit of our hospital retrospectively evaluated the records of patients with a suspected TB in pathology reports in 2016. The patients with a completed TB evaluation were included. They were separated into two groups as the patients that diagnosed by Tuberculosis Dispensaries after the notifications of our surveillance team, and the ones that diagnosed by the physicians who requested the biopsy evaluations and evaluated the results. **Results:** 86 patients with TB notification according to pathology reports were evaluated. The tests were completed in 44 (51.2%) of cases. TB diagnosis was excluded in 10 cases, 34 (77.3%) cases were diagnosed with TB. Nineteen cases (56%) were diagnosed after notifications of surveillance unit. Particularly skin, lymph node, and urinary system TB were the domains, which the notifications of surveillance team were more efficient. **Discussion:** Surveillance studies are one parameter of TB control, and prevent the delays in diagnosis and management. Meticulous maintenance of active surveillance, which has started in 2003 in Ankara and became widespread in all country in 2015, will minimize the number of undiagnosed TB cases.

### Keywords

Tuberculosis; Active Surveillance; Pathology Report

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## Introduction

Tuberculosis (TB) remains a serious public health problem today; it is estimated that one quarter of the world's population is still infected with *M. tuberculosis* [1]. As a plan to prevent the TB epidemic, which was declared by the World Health Organization (WHO) as a global threat in 1993, it was aimed to diagnose 70% of contagious patients and treat 85% of them [2]. These goals were not reached in 2000, and in 2005 85% of the cases were treated. However, only 60% of the estimated smear-positive cases could be diagnosed [3]. In 2010, while the estimated number of new cases was 8.8 million, 5.8 million cases were diagnosed [4]. In 2015, the expected diagnosis and treatment goals could not be achieved and The End TB strategy was developed. The goal is to reduce the incidence of TB by 90% in 2015 and the mortality by 95% in 2035 [1]. This situation requires efforts to increase the number of case detection. Active surveillance is the most fundamental step in these studies. Surveillance is systematic and continuous collection, classification, analysis and interpretation of data for controlling the contagious diseases. Active surveillance is periodic collection of data by authorized personnel without waiting reports of officials and institutions that are responsible for disease notifications. The goal is to prevent delay in diagnosis and treatment of TB. One of the two important components of the standard tuberculosis surveillance system developed by WHO is the speed of case detection. Screening and reporting TB reports of all biopsy specimens examined at hospital is a part of active TB surveillance and increases the case finding speed. This study aims to investigate the effect of active TB survey conducted by the surveillance unit established in our hospital on TB case detection rate.

## Material and Method

Since 2003 an active tuberculosis surveillance in our hospital was performed by a chest physician and assistant health personnel. The assistant health personnel were mainly performing the Respiratory Function Test and at the same time were performing TB surveillance as an additional task. At the end of 2015, the surveillance unit was established as a single unit to report all infectious diseases and TB surveillance was also taken over. This unit is administered by two nurses responsible for infectious disease and clinical microbiology specialist. One of these two nurses additionally was working at the cancer registry unit. Although there is passive surveillance for reporting of many infectious diseases in this unit, active surveillance for tuberculosis continues. Screening of pathologic examination reports is a part of active surveillance.

In this study, the number of TB cases notified one year before (2015) and one year after (2016) establishing of the surveying unit were investigated. Secondly, the pathologic examination reports searched by the surveillance unit in 2016 and according to the interpretation of these reports, possible TB notifications of case files were retrospectively reviewed. Patients whose TB investigation was completed were involved in the study. TB patients who were reached by Tuberculosis Dispensary after the "possible TB" warning of from our hospital were diagnosed TB and were recorded as patients, detected by the announcement from our surveillance unit. Patients who were referred to the TB investigation at the doctor's biopsy request and those who

were diagnosed TB after examinations were recorded as the patients identified by the relevant doctors.

At the same time during 2016, the smear number of sputum / bronchoalveolar lavage and respiratory tract specimens samples viewed in the hospital and the positivity rates of Acid-Resistant Bacilli (ARB) and mycobacterial culture were recorded. Local ethics committee approved the study.

## Results

A year before the establishment of the surveillance unit (2015) 22 TB cases were notified, and in 2016 it was determined that 115 TB cases were reported from our hospital (Table 1). Among notifications made in 2016, 86 were diagnosed as pathologic examination reports, 17 as preliminary/ final clinical diagnosis and 12 were reported as a microbiological diagnosis with positive smear and / or culture. (Table I).

In 2016, 74425 pathologic examination reports which resulted in our hospital were screened weekly. The cases that were investigated and pre-diagnosis of TB are summarized in Table II. Among 34 pathological examination case reports with TB diagnosis, the granulomatous reaction was found in 20 (58.8%) cases, in 8 cases (23.5%) giant cell, only one was Langhans type, and necrosis presented at 6 of the cases (17.6%).

The patients were asked who has told them about the the necessity of TB disease investigation. It was learned that 19 (56%) of the patients who were notified by pathologic examination reports with confirmed TB diagnosis were found to have been detected by notice of the surveillance unit (Table III). It was noteworthy that all patients with TB in the urinary system were detected by the notice of surveillance unit. In cases of skin and lymph node TB, it was also observed that a significant part of the patients were detected with the report of surveillance unit. Two patients with tongue and thyroid gland TB were also diagnosed by our unit; as for two patients with TB meningitis and pleural TB despite reports of pathologic examination samples, patients were diagnosed by clinicians. Microbiological examinations of TB that were performed in our hospital in 2016 are given in Table IV. The caseous necrosis was detected after the vertebral bone biopsy by taking paraspinal abscess culture from the patient.

Among diagnosed patients female/male ratio was 21/13 and 85% (n=29) of them were living in Ankara. The investigation of lung/ extrapulmonary involvement was at rate of 2/32. 94% of patients (n = 32) were born in Turkey.

## Discussion

According to the World Health Organization's (WHO) global TB report of 2016, despite the grant of 49 million TB treatments between 2000 and 2015, an important diagnosis and treatment deficiency is still continuing.

Only in 2015 6.1 million new cases were reported. It is supposed that 4.3 million unregistered cases take place.

There is an opinion that half of the unreported patients are in India, Nigeria and Indonesia. At the same time it is considered that diagnosis and case reporting in Turkey rate is insufficient. As stated in the report of fight against tuberculosis in Turkey, the incidence of TB disease was 28.1 per 100,000 in 2003 while in 2013 it decreased to 17.2 [6].

Table 1. Distribution of TB notifications in 2016.

TB notifications in 2016	Total	Pulmonary involvement	Extrapulmonary organ involvement
Clinical diagnosis	17	1	14
Microbiological diagnosis	12	9	4
Pathologic pre-diagnosis	86	2	84
Clinical and microbiological diagnosis	4	3	1
Clinical and Pathologic pre-diagnosis	9	0	9
Microbiological Pathologic pre-diagnosis	1	0	1
Total	115	12 (%10,5)	103 (%89,5)

\*The list is based on the first notice made in cases with double reporting.

Table 2. Following up of the patients with possible tuberculosis notification by the pathological investigation report.

2016 year	n
Number of samples of pathological examination during the year	74425
Numbers of researches with detected granulomatous reaction	91
Number of reports of granulomatous reactions with possible TB notification	86 (%94,5)
Completed examinations of reports with possible TB notification	44
Completed examinations with TB diagnosis	34/44
Final TB diagnosis notified by active surveillance and later confirmed by The Tuberculosis Fight Dispensary *	19/34

\* The patients were asked who told them about the necessity of investigation of TB disease.

Table 3. Diagnosis of patients with pathological pre-diagnosis after TB notifications and units which made diagnosis.

Attacked Organ	Number of Patients Detected by Survey Unit	Number of Patients Identified by Clinician	Total
Skin	5	3	8
Lymph Node	6	8	14
Urinary System	4	-	4
Lungs	1*	1	2
Breast	1	1	2
Other	2	2	4
Total	19/34 (%56)	15/34 (%44)	34/34

\* A biopsy was performed because of parenchymal lymphadenopathy of the pulmonary TB case detected by the surveillance unit. It was seen that the TB spread for ARB / culture was not looked at.

\*\* All samples belong to different patients. There are no patients with two biopsy specimens.

Table 4. Microbiological tests performed on TB.

2016 year	Pulmonary (n)	Extrapulmonary (n)
Total number of received samples	2155	72
Smear (+)	Sputum (n=1)*	Urine (n=1)
Culture (+)	Sputum (n=9)	Urine (n=1) CSF (cerebrospinal fluid) (n=2) Paraspinal abscess (n=1)**
Microbiological diagnosis	9	4

\* One of the sputum samples was both smear and culture positive. \*\* At the same time, caseous necrosis was detected during the vertebral bone biopsy.

In 2015 this ratio was 15.4 (n = 12550) [7]. However, WHO estimates that there were 14,000 cases in our country in 2015 [1]. So it is thought that about 1250 cases couldn't have been diagnosed. In the same year, it was published that there are 577 TB cases in province of Ankara [8]. This year, 22 patients were notified from our hospital. In view of the fact that we are one of the largest hospitals in Ankara, it can be predicted this number of reports does not reflect the actual number of patients. Male and female patient rates all over the country were reported as 56.5%, 43.5% respectively [9]. Pulmonary and extrapulmonary TB rates were 64.4% and 35.6% respectively [10]. 77% of pulmonary TB cases are proved to be bacteriological [1]. However, in adults with TB disease, 50% of the cases are expected to be smear-positive pulmonary TB [11]. In this circumstances it can be said that an important part of the undiagnosed patients are extrapulmonary TB cases. In our study, it was observed that 89.5% (n = 103) of the patients who were notified as TB were extrapulmonary TB cases. At the time of the study preparation, it was observed that this ratio (32/34) of the patients with confirmed TB diagnosis who were taken as a basis favored extrapulmonary organ involvement. For this reason, in every hospital in our country, careful examination of pathological examination reports is thought to significantly reduce the number of cases that cannot be diagnosed. For this purpose, the TB Active Surveillance Study, initiated in Ankara in 2003, was implemented nationwide by 2015 and the task was assigned to the surveillance unit responsible for all infectious disease notification. As for the nurses who are tasked with this work, it was aimed not to give any additional duty. Nurses in our hospital have an additional duty (cancer registration). Although this additional task was initially seen as a disadvantage, it was very useful for increasing the functionality of the work. As all pathology reports need to be scanned meticulously for both tasks no unexamined report was found. Due to this study, it was seen that some branch physicians should increase their responsivity about TB and trainings were planned. It was aimed that these clinicians make important contributions to speed of case seizing. WHO stated that between 2005 and 2014 the budget reserved for investments and researches intended for TB treatment and prevention never exceeded \$ 0.7 billion per year and that an additional \$ 1 billion should be added annually for the development of effective methods [1]. It is difficult to determine the cost of screening of pathologic examination reports and investigation of cases with detected granulomatous reaction. However, by taking into consideration the fact that providing an opportunity for early detection and treatment of TB patients and decrease the TB spreading speed, it can be said that the cost effective. The only task for hospitals is to involve educated and appropriate staff to this task. As a result, TB Active Surveillance Study carried on with accuracy will reduce the number of undetectable TB patients. The number of TB cases envisaged by the increasing number of immigrants is also increasing. For this reason, diagnosing and treating as many cases as possible will make it easier to reach 2035 TB targets.

**Scientific Responsibility Statement**

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

**Animal and human rights statement**

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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**Conflict of interest**

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